

REMARKS

Applicants respectfully request reconsideration and further examination of the present application.

I. Information Disclosure Statement

The undersigned would like to thank the Examiner for the time spent briefly discussing the issues surrounding references 36-54 of Applicants' Information Disclosure Statement filed on April 11, 2002. Consistent with that conversation, a Supplemental Information Disclosure Statement is being submitted with this Amendment A, along with a copy of page 3 of the 1449 form Applicants previously submitted on that date, which lists references 36-54 thereon.

II. Status of Pending Claims

Consistent with Applicants' Response to Restriction and Election of Species Requirements dated November 2, 2004, only claims 49-69 and 102-110 are currently pending in the present application. All other claims have been canceled without prejudice.

In this Amendment A, claim 63 has been canceled because it is redundant in view of claim 62. Additionally, claim 69 has been amended for purposes of clarification only, the claim having been amended to indicate that the hydrophilic layer is substantially free of crosslinks. Support for this amendment may be found in the present application, for example, on page 11, lines 3-7.

Accordingly, claims 49-62, 64-69 and 102-110 are now pending.

III. Amendment to the Specification

The specification has been amended to remove the hyperlink and/or other form of browser-executable code, consistent with the requirements of MPEP §608.01, subsection VII. Accordingly, Applicants respectfully submit the objection related thereto is now moot.

IV. 35 U.S.C. §112, Second Paragraph

Reconsideration is respectfully requested of the rejection of claims 49-69 and 102-110 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

A. *"Polymer Brush"*

Applicants respectfully submit use of the term "polymer brush" to reference something which comprises a *substrate surface*, in addition to a hydrophobic polymer layer and a hydrophilic polymer layer, is not indefinite and thus does not fail to particularly point out and distinctly claim the subject matter Applicants regard as the invention. The present application repeatedly indicates that the "polymer brush" of the present invention includes both the substrate surface and the polymers attached thereto; see, for example (emphasis added):

- Page 1, lines 9-10 (the first sentence of the application), which states "This invention relates to a **polymer brush that features** polymer layers on a substrate surface."
- Page 2, lines 21-23, which states "Controlled free radial polymerization methods with living-type kinetics have been

used to covalently bond polymers to the surfaces of substrates **and thereby form** 'polymer brushes.'"

- Page 8, lines 4-7, which states "polymer brushes for binding a molecule in an aqueous sample in an assay can be prepared to possess polymer chains, attached to the substrate surface **of the brush.**"

Accordingly, Applicants respectfully submit that, even assuming *arguendo* that use of the term "polymer brush" is not consistent with how this term has been used by others in the art, Applicants have clearly set forth their intended meaning of this term, consistent with MPEP §706.03(d). Thus, the term "polymer brush" as used herein is not indefinite. Applicants therefore respectfully request reconsideration of this rejection.

B. Claim 63

In as much as claim 63 has been canceled, Applicants respectfully submit the rejection related thereto is moot.

C. Claim 69

As previously noted, claim 69 has been amended for purposes of clarification. Specifically, the claim has been amended to indicate the hydrophilic layer is substantially free of crosslinks. As noted on, for example, page 11, lines 3-7, this is preferred, in order to maximize the "solution-like" character of probes attached thereto.

In view of the amendment to claim 69, Applicants respectfully request reconsideration of the rejection of this claim for being indefinite.

V. 35 U.S.C. §102(e)/§103

Reconsideration is respectfully requested of the rejection of claims 49-69 and 102-110 as being anticipated by, or obvious in view of, Wagner et al. (U.S. Patent No. 6,475,808).

1. Claims 49-62 and 64-69

Claim 49, from which claims 50-62 and 64-69 depend, is directed to a polymer brush for binding a molecule in an aqueous sample in an assay. The brush comprises:

a substrate surface, a hydrophobic layer comprising hydrophobic polymer chain segments attached to the substrate surface **and having a dry thickness of at least about 50 angstroms**, and a hydrophilic layer attached to the hydrophobic layer containing functional groups for the attachment of a probe for binding the molecule.

As noted in the present application (see page 12, lines 9-20), Applicants have discovered that stability of the covalent bonds which link the polymer chains to the substrate surface of the brush, when exposed to hydrolyzing conditions, can be increased by forming a hydrophobic layer *of some minimum thickness* on the substrate surface. This hydrophobic layer thus acts as a "barrier" which limits access of hydrolyzing reactants to these covalent bonds.

The Office acknowledges that Wagner et al. do not discuss thickness of the hydrophobic layer (see page 4, last full paragraph). However, the Office asserts that this parameter would be inherent in the Wagner et al. compositions, or constitute an obvious variation in parameters which are routinely optimized in the art. Applicants respectfully disagree.

The mere fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. See MPEP §2112 (citing *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993)). Furthermore, in relying upon the theory of inherency, the Office must provide a basis in fact and/or technical reasoning, to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. See MPEP §2112 (citing *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)). Applicants respectfully submit the Office has failed to meet its initial burden here, because it has simply stated the claimed thickness would be inherent, without providing any basis in fact or technical reasoning in support of this statement.

In this regard Applicants note that, although Wagner et al. claim a device having hydrophobic and hydrophilic monolayers, other than in the claims (i) the term "hydrophilic" does not appear elsewhere in the patent, and (ii) the term "hydrophobic" appears only in the Examples, but is only used in reference to the hydrophobic nature of the surface of a silicon substrate. Furthermore, Wagner et al. do not exemplify the preparation of a single sample which comprises a substrate surface, a *hydrophobic polymer* layer attached thereto, and a *hydrophilic polymer* layer attached to the *hydrophobic polymer* layer.

As for the Office's assertion that the claimed layer thickness would constitute obvious variations in parameters which are routinely optimized, Applicants additionally point out that, in addition to the fact that each and every element of claim 49 is not taught or suggested by Wagner et al., Wagner et al. simply provide *no motivation* to prepare a polymer brush as claimed. For example, they make no reference to the importance of stability of the covalent bonds, which attached the hydrophobic polymer chains to the substrate surface, against hydrolyzing conditions. Furthermore, to the extent that Wagner et al. even generally reference hydrophobic monolayer thickness, they are clearly focused on very thin layers (see, for example, column 7, lines 55-56, wherein they state that a "monolayer" is a *single-molecule thick* organic thin-film).

Accordingly, Applicants respectfully submit claim 49 is both novel over, and nonobvious in view of, Wagner et al. Reconsideration of this rejection is therefore respectfully requested.

In as much as claims 50-63 and 64-69 depend from claim 49, these claims are submitted as novel over the cited reference for at least the same reasons as those noted with respect to claim 49. Although these claims include additional novel features, these features will not be addressed in detail at this time in the interests of brevity.

2. *Claims 102-110*

Claim 102, from which claims 103-110 depend, is directed to a polymer brush for binding a molecule in an aqueous sample in an assay. The polymer brush comprises:

a substrate surface having a polymer layer thereon, said polymer layer comprising a first hydrophobic layer attached to the substrate surface, and a second hydrophilic layer attached to the hydrophobic layer containing groups for the attachment of a probe for binding the molecule, said brush being characterized in that, **upon being immersed in a 10 mmolar sodium hydroxide solution for about 15 minutes, the polymer layer thickness is reduced by less than about 40%.**

It is noted that the Office has rejected claims 102-110 without further comment (see page 4, paragraph "9)" therein). Applicants therefore respectfully submit that if the Office's position is that the above-noted feature of claim 102 is inherently present in the Wagner et al. compositions, the Office has also failed to meet its initial burden here, because it has failed to provide any basis in fact or technical reasoning in support of this position. Applicants additionally point out that, in addition to the fact that each and every element of claim 102 is not taught or suggested by Wagner et al., Wagner et al.

simply provide *no motivation* to prepare a polymer brush as claimed, because Wagner et al. make no reference to the importance of limiting hydrolysis of the bonds which link the hydrophobic polymer chains to the substrate surface.

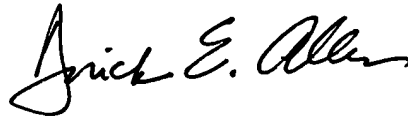
Accordingly, Applicants respectfully submit claim 102 is both novel over, and nonobvious in view of, Wagner et al. Reconsideration of this rejection is therefore respectfully requested.

In as much as claims 103-110 depend from claim 102, these claims are submitted as novel over the cited reference for at least the same reasons as those noted with respect to claim 102. Although these claims include additional novel features, these features will not be addressed in detail at this time in the interests of brevity.

CONCLUSION

In view of the foregoing, favorable reconsideration and allowance of all pending claims is respectfully requested. A check in the amount of \$120.00 is enclosed for the one month extension for this reply. However, the Commissioner is hereby authorized to charge any underpayment and credit any overpayment of government fees to Deposit Account No. 19-1345.

Respectfully submitted,



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